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ABSTRACT

Findings concerning the relationship of perceptual-motor and oral-language organization to later reading achievement are discussed in relation to a predictive battery of 15 tests. It was concluded that the predictive efficacy of the tests depends on the degree to which they measure integrative ability rather than on the specific skills measured. (AA)

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SOME FINDINGS ON PREDICTING READING PERFORMANCE AT THE KINDERGARTEN LEVEL

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"Not the eye but the brain learns to read." Rodman Irvine.

Reading and writing are given fundamental importance in our culture. The teaching of these two skills comes to be regarded as the principal task of the elementary school despite whatever else is to be taught. It is believed therefore, that mastery of reading and writing multiplies the potentialities of the child for further learning and for increased self reliance. As a result, there is evidence of the very strong tradition in educational research directed toward improved teaching of reading (1).

In view of the massive research done on this topic the object of this paper is to bring to light some of the findings concerning the child's perceptuo-motor and oral-language organization in predicting reading achievement.

"Readiness" is a very controversial subject. However, it seems clear that no real dichotomy exists between readiness conceived as an intrinsic state of the organism, and readiness viewed primarily as the result of stimulation and teaching.

Considerable evidence testifies to the fact that a variety of social and environmental (2) and psychological (3) factors are significant in the acquisition of reading skills; we concur with Abraham Fabian (4) who maintains that learning to read requires the developmental timing and integration of both neurophysiological and psychological aspects of readiness. It is assumed that a child's

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perceptuo-motor and language level at kindergarten age forecasts his later performance on such highly integral tasks as reading and writing.

A growing number of schools assess children's readiness for formal education by one of three procedures: reading, readiness tests, intelligence evaluations, and informal evaluation of the child by the kindergarten teacher. While all three of these measures have proved their usefulness, each has certain limitations (5).

The use of intelligence tests for prediction has been challenged (6) on grounds that reading difficulties occur among children at virtually all intelligence levels. An intelligence quotient, furthermore, represents a global rather than a differentiated evaluation of a child's potential and fails to take into account some aspects of perceptual functioning that seem to be important determinants in early reading success or failure.

A number of researchers have attempted clinical (7, 8) and statistical predictions of reading performance. Some have used single variables such as auditory discrimination (9) visuomotor competence (10), the anxiety level of the child (11) or his self concept (12) as demonstrated in kindergarten or early months later. Clyde Martin (13) and other researchers have relied on batteries of predictive tests. One of the earliest and best instruments is Marian Monroe's (14). Several test batteries for predicting reading performance have appeared recently; the most inclusive, by Max Weiner and Shirley Feldman (15) consists of eight perceptual and language tests; another, by Thomas Bareet (16) uses a variety of visual discrimination tests and there is now an instrument being developed by Chall and her associates.

McDonald Critchley (17) has discussed the significance for reading of visual defects. The 1940 report of the Ophthalmological Section of the Los Angeles County Medical Association states:

> "...If the visual acuity is reduced 50% or more, the child will have difficulty in interpreting symbols because he can not see well... Except in far-sightedness and astigmatism of a marked degree, the child's power of focusing is sufficient to give adequate though not perfect vision, and a small amount of myopia may even be an advantage rather than a disadvantage in reading. The presence of a crossed eye with normal vision in one eye has little or no effect on reading ability... Compensated muscle imbalance, such as phorias of a marked degree, does not affect interpretation of symbols... So called 'faulty' eye movements, as judged by regressions, depend primarily on poor visual understanding of subject matter read and not on incordinated eye muscles."(18)

The role of psychopathology as a cause of reading difficulties has been discussed by many authors. A distinction has been made in the literature between "specific" reading, writing and spelling disorders, and learning disabilities that are related to ego impairment (19). Gerald Pearson (20) says that, in the latter, the dominance of "primary processes" interferes with the ability to utilize information (as they do, for instance, in the child for whom the printed letters on the page represent hostile and threatening forces).

The selection of the kindergarten tests reflects the theoretical position derived from Jean Piaget (21) Arnold Gesell, Heinz Werner, and Ler Vygotsky who postulate evolving stages in sensori-motor, perceptual, and linguistic functioning. It is assumed that a child's perceptuo-motor and language levels at kindergarten age forecast his latter performance on such highly integrated tasks as reading, writing, and spelling.

The tests under consideration in this paper were administered at the Pediatric Language Disorder Clinic, Babies Hospital (22) to groups of intelligent four and five-year-old youngsters who had been referred initially because of oral-language deficits. Only the tests germane to the prediction of reading skills are treated in this paper:

1. CONCOMITANT MOVEMENTS

According to Teicher (23) much of the toddler's behavior is global and involves activity of the total organism. Global motility presumably reflects immature central nervous system organization, and a number of researchers have observed a relationship between undifferentiated motility and reading disorders.

2, 3, 4. GROSS MOTOR PATTERNING

Balance, Hopping, and Throwing: - Gesell (24) maintains that postural skills "...serve as an essential preparation for the development of the more refined skills of later years. That excessive clumsiness is a feature in some children with reading disabilities has been observed by many teachers and has been confirmed by a number of researchers.

5. HAND PREFERENCE

This test was designed to determine whether or not the child chowed a clear-cut functional dominance of one hand over the other at kindergarten age. That ambiguous lateralization, which is assumed to reflect poorly defined cerebral dominance is a concomitant of reading difficulties was postulated first by Orton (25).

6. BODY IMAGE

That the maturational level of a child's human figure drawing and his school achievement are significantly related has been demonstrated by a number of investigators. Elizabeth Koppitz (26) found that a child's score on his human-figure drawing at the beginning of first grade was predictive of his reading level at the end of the year.

7. BENDER VISUO-MOTOR GESTALT TEST

This test evaluated evolving competence in the area of visuo-motor experiences. Primitive and poorly integrated Bender Gestalten were found to be characteristic of children with reading disabilities. That the Bender Visuo-Motor Gestalt Test predicts reading achievement as adequately as do reading readiness tests has been demonstrated by other studies (27).

8. WORK RECOGNITION

A child's mastery of printed words depends of necessity on his comprehension of these words when he hears them in conversation. In fact, Elmer Morgan (28) found a significant correlation between performance on a picutre vocabulary test and reading achievement.

9. LANGUAGE COMPREHENSION

A simple story, appropriate for kindergarten age, was told to all subjects. Grasp of the gist of the story and comprehension of one spatial and two temporal concepts were evaluated. Insight into grammatical relationships and ability to process and retain material heard are involved in this task. Both are of importance in reading, which requires the integration of content into an existing framework (29).

10. EXPRESSIVE-LANGUAGE TESTS

According to McCarthy (30) and Caroll (31), correct articulatory patterns are usually established by age six. Defective articulation may interfere with reading in several ways. A child who substitutes th for s, for instance, may confuse the words sing and thing when he meets them in print and he may thus misinterpret the meaning of the sentence.

11. STORY ORGANIZATION

Scoring on this test is based on ability to get across the point of a familiar story and to reproduce a number of relevant details. In order for him to marshal events in a sequence, the child must have attained a fairly high level of inner language organization. Weiner and Feldmann found story telling to be predictive of end-of-first grade reading performance.

12. SENTENCE ELABORATION

That some children use primitive sentence structures and other use complex ones is well known to kindergarten teachers. Strickland (32) found that the best readers used a significantly greater number of elaborated sentences than did the poorest readers.

13. NUMBER OF GRAMMATICAL ERRORS

At Kindergarten age, children's mastery of the grammatical structure of the language varies strikingly. This variability is largely related to the way language is used in their homes. On the other hand, mastery of correct grammatical forms varies considerably within a given social milieu.

14. LETTER NAMING

Six letters of the alphabet were exposed and the children were asked to name them. It has been shown that ability to name letters at the beginning of the first grade is highly predictive of reading achievement at the end of the year (33).

15. NUMBER OF WORDS

The number of words used by the child during story telling was totaled. It is believed that length of verbal responses is a relatively simple and objective measure of a child's level of spoken language.

These tests were administered again to the same group of children $2\frac{1}{2}$ years later to check again on the reliability of prediction. Among the expressive-language tests administered at the kindergarten level, NUMBER OF WORDS proved to be by far the best predictor. Performance on this task varied to an extraordinary degree; the number of words used ranged from 54 to 594. Richness of verbal output, whether related to environmental stimulation, inherent linguistic endowment, or to both, is apparently an excellent prognostic sign.

Graphomotor ability showed a fairly high correlation with reading and writing; difficulties with pencil management are occasionally found in children who are skillful in manipulating objects like puzzles or models. The fact that an activity like name writing was associated with reading competence seems to show that in name writing, verbal symbolic factors, in addition to motoric ones are involved.

All reading readiness tests except one, LETTER COPYING were predictive of later performance. These tests primarily involve visual perception. Most reading readiness tests, since they require the child to respond to abstract forms, that is to say, to letters and words, demand a high level of visual-perceptual maturity. It is not surprising, therefore, that nearly all reading readiness tests showed significant correlations with later achievement measures. The reading readiness tests administered at end of Grade I included: Frank Freeman's Zaner-Bloser Test (34) and the Gates Sentence and Paragraph test (35). At the end of Grade II, writing tests were administered.

Reading readiness tests such as WORD MATCHING and NAME WRITING measure of course performance that are similar to those involved in the reading and writing process itself. However, the HUMAN FIGURE drawing and the BENDER GESTALT TESTS were also direct relation to reading. Both tests, like reading, writing, and spelling, require the ability to organize parts of a Gestalt into a meaningful whole; in other words, they call for a relatively high degree of integrative competence.

In conclusion, the predictive efficacy of the tests depends not on the specific skills involved, but on the degree to which they measure integrative ability. If this ability is weak at kindergarten age, it augurs poorly for reading at the end of second grade, since at that stage a relatively high level of integration is required.

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